

THERMAL BURN IN A 30-MINUTE-OLD NEWBORN: REPORT ON THE YOUNGEST PATIENT WITH IATROGENIC BURN INJURY

BRÛLURE CHEZ UN NOUVEAU-NÉ DE 30 MN DE VIE: LE PLUS JEUNE CAS DE BRÛLURE IATROGÈNE

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SUMMARY. Burns in infants are rare. The majority of neonatal burns occur in the hospital setting. The immaturity of their immune system, their fragile and thin skin, difficulties in resuscitation, engraftment paucity limited by donor sites, and long-term complications make taking care of burned newborns extremely difficult. We present the case of a newborn burned 30 minutes after his birth over a total body surface of 35%, when the hot water bottle used in the hospital accidentally burst. This is the earliest iatrogenic burn in a newborn reported to date. The newborn was discharged home after 30 days in hospital for resuscitation, dressings and skin grafting. He is now under regular observation.

Keywords: thermal burn, neonatal burn, iatrogenic burn

RÉSUMÉ. Les brûlures des nouveau-nés sont rares et surviennent dans la plus part des cas à l'hôpital. L'immaturité de leur système immunitaire, leur peau fine et fragile, les difficultés de la réanimation, les possibilités limitées de greffes en raison de l'exiguïté des sites donneurs rendent leur prise en charge extrêmement difficile et la survenue de séquelles fréquente. Nous rapportons le cas d'un enfant brûlé sur 35% SCT à 30 mn de vie en raison de la rupture d'une bouteille d'eau chaude à l'hôpital, la brûlure iatrogène la plus précoce rapportée à ce jour. Il est sorti de l'hôpital à J30, ayant eu besoin de greffes et est actuellement régulièrement suivi.

Mots-clés: brûlure, néonatale, iatrogène

Introduction

Neonates are a particularly complex group of patients regarding burns, mainly due to the immaturity of their immune system, the fragility of their skin, the scarcity of donor sites for skin grafting, and long-term complications. Most neonatal burns occur in the hospital setting.

Case presentation

We present the case of a newborn accidentally burned 30 minutes after his birth by hot water when the hot water bottle used to warm him suddenly burst. Thirty-five percent of his total body surface area was burned, mainly his back and lower limbs (*Fig. 1*). The baby was immediately placed in the charge of our plastic surgery team and a specialized neonatal care team.

Intravenous fluid resuscitation according to the Parkland formula was initiated, using lactate Ringer solution with dextrose, with a urine output target of 1.5 to 2 ml/kg/hr, and was adjusted according to the baby's oral intake and urine output. Serum electrolytes and renal function parameters were within

normal range, with evidence of polyuria during the first days post burn. No hyperthermia >39 degrees Celsius was observed during the entire management course. Prophylactic IV antibiotics (amoxicillin-clavulanic acid) were given after 48 hours post burn and for a total of 10 days. No evidence of systemic



Fig. 1 - Neonate burned by hot water 30 min after birth, 35% TBSA, 2nd and 3rd degree burns.

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Fig. 2 - Neonate 3 days after the burn incident.

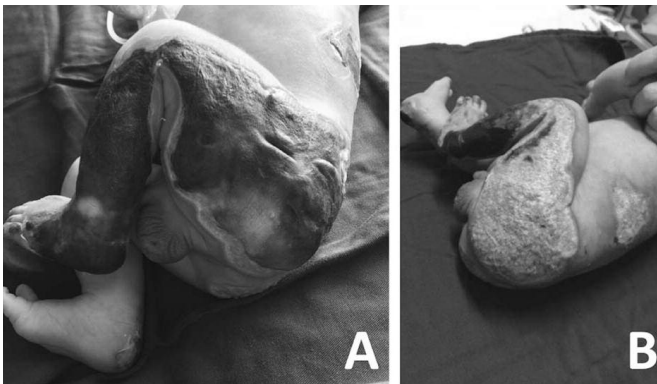


Fig. 3 - (A) Neonate 7 days after the burn incident. (B) Neonate at 12 days post burn.

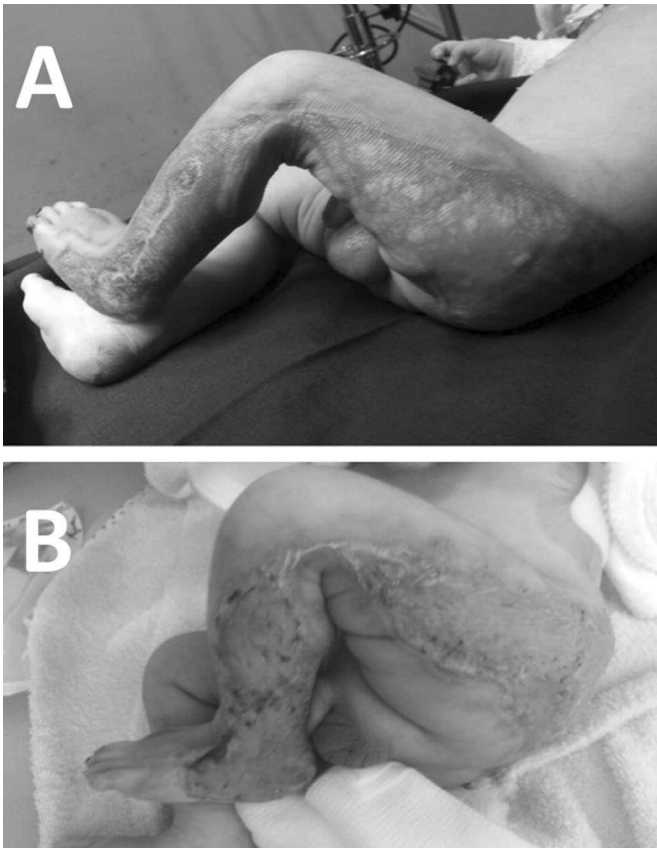


Fig. 4 - (A) Neonate at 4 weeks post burn. (B) Neonate 10 days after skin grafting.

infection was noted during the course, but wound colonization by *P. aeruginosa* and *E. faecalis* was reported. Analgesic control, especially during dressing changes, was done using oral paracetamol. Hepatic function tests remained within normal range for a newborn. Tetanus prophylaxis was given.

Escharotomy of the newborn's left foot was done a few hours following the burn, due to severe edema. The burned areas were dressed using Jelonet (non-medicated low-adherent sterile paraffin Tulle Gras dressing) (Smith & Nephew) twice daily for the first 14 days until the eschar was almost completely detached, then once daily using Medihoney® Tulle Dressing (medical grade honey) (Derma Sciences Europe Ltd., Maidenhead, Berkshire, U.K.) for an additional 14 days. The burned areas were cleaned using baby shower gel (zwitsal baby bath – The Netherlands) and sterile normal saline solution, with daily showers and frequent diaper changing. Throughout his stay in hospital, the baby had a good intake of breast milk and was alert and active. Skin graft was performed 4 weeks after the burn injury (Figs. 2 - 4).

Discussion

While the majority of burns in neonates occur in the hospital setting, their mechanisms range from scald burns while bathing, contact burn from heating bottles in incubators, electrocautery pads, and even radiant heat.^{1,2}

Burn injuries have been documented in babies as young as 1 day old and in several premature babies as a result of child abuse.³ Domestic scald burns were also reported in an 11-day-old neonate, who sustained 51% burns (when the hot water bag used by the mother accidentally burst).⁴

Our case is the youngest burn victim reported in a hospital setting. The burn injury occurred 30 minutes after the baby's birth. Among various prognostic factors, age has been used as a predictor of mortality in burn victims, but its effect in neonates is less clear-cut. While it is generally agreed that patients younger than 2 years are at a higher risk of sustaining burns involving more than 30% TBSA and clearly have a higher mortality compared to older patients, other parameters such as burn mechanism, TBSA, burn depth, treatment methods and comorbidities, among many other variables, make it difficult to assess a single predictor of mortality.

Resuscitation of pediatric patients, especially those younger than 2 years, is very challenging. In addition to lactated Ringer solution, it necessitates the use of a dextrose-containing solution, as their liver glycogen stores cannot maintain adequate blood sugar levels.⁵

Urine output in a neonate should be maintained at 1.5 to 2 ml/kg/hr. Burned children are generally at increased risk of hypothermia, which should be prevented by administering warm IV fluids and using heating blankets or lights as indicated.⁶

Pain control is another major component in the management of pediatric burns. Proper pain assessment can be achieved by combining methods such as feedback from the parents, clinical observation and pain scores.⁷ All neonates should be considered at risk of tetanus infection, except children born to mothers vaccinated by tetanus toxoid 5 to 10 years before delivery.⁸

Topical antimicrobials are vital to proper burn wound management. The use of silver sulfadiazine cream in the pediatric population has many drawbacks and has been shown to in-

crease the risk of methemoglobinemia, hemolysis and bone marrow suppression.⁹ Aquacel Ag, a silver impregnated hydrofiber dressing, is found to be superior to silver sulfadiazine in terms of efficacy and safety in the pediatric population,¹⁰ although no specific recommendation concerning neonates is made. As for other topical burn wound treatments, no age-related contraindications are reported.¹¹ In our case, we elected to use paraffin gauze dressing for the first 14 days. After eschar separation, we used medical honey tulle for an additional 14 days. Skin grafting was done at 4 weeks after the incident, with 100% graft intake.

The baby is currently under regular medical observation. He underwent surgery a few months later in order to release contractures on his left knee and ankle.

Conclusion

Most neonatal burns are reported within the hospital setting. They are extremely rare and challenging for the burn surgeon. Adequate resuscitation, close monitoring, topical wound care, debridement and skin grafting, when indicated, remain the cornerstones of treatment.

BIBLIOGRAPHY

1. Möhrenschrager M, Weigl LB, Haug S et al.: Iatrogenic burns by warming bottles in the neonatal period: report of two cases. *J Burn Care Rehabil*, 24(1): 52-55, 2003.
2. Koh TH, Coleman R: Oropharyngeal burn in a newborn baby: new complication of light-bulb laryngoscopes. *Anesthesiology*, 92: 277-279, 2000.
3. Greenbaum AR, Horton JB, Williams CJ, Shah M, Dunn KW: Burn injuries inflicted on children or the elderly: a framework for clinical and forensic assessment. *Plast Reconstr Surg*, 118(2): 46e-58e, 2006.
4. Bhatia VY, Mishra S, Menon PA, Nanavati N: Life threatening deep scald burns in a neonate: A rare case report. *Indian J Plast Surg*, 46: 130-133, 2013.
5. Sheridan RL: Burns. *Crit Care Med*, 30(11 Suppl): S500-14, Review, 2002.
6. Galligan M: Proposed guidelines for skin-to-skin treatment of neonatal hypothermia. *MCN Am J Matern Child Nurs*, 31(5): 298-304, 2006.
7. Martin-Herz SP, Patterson DR, Honari S, Gibbons J et al.: Pediatric pain control practices of North American Burn Centers. *J Burn Care Rehabil*, 21(4): 26-36, 2003.
8. Blencowe H, Lawn J, Vandelaer J, Roper M, Cousens S: Tetanus toxoid immunization to reduce mortality from neonatal tetanus. *Int J Epidemiol*, 39(1): 102-9, 2010.
9. Fuller FW: The side effects of silver sulfadiazine. *J Burn Care Res*, 30(3): 464-70, 2009.
10. Caruso DM, Foster KN, Blome-Eberwein SA et al.: Randomized clinical study of Hydrofiber dressing with silver or silver sulfadiazine in the management of partial-thickness burns. *J Burn Care Res*, 27(3): 208-309, 2006.
11. Al-Ahdab M, Al-Omawi M: Deep partial scald burn in a neonate: A case report of the first documented domestic neonatal burn. *J Burn Care Res*, 32(1): e1-e6, 2011.

Conflict of interest. The authors declare that they have no conflict of interest related to this article.